

**UNIVERSITY OF HELSINKI**  
**FACULTY OF BEHAVIOURAL SCIENCES**



**Terhi Esko**

**SOCIETAL PROBLEM SOLVING AND  
UNIVERSITY RESEARCH**

**Science-Society Interaction in the Humanities  
and Social Sciences**

**CRADLE**  
Center for Research on Activity, Development and Learning

**Working papers 2/2013**



University of Helsinki  
Center for Research on Activity, Development and Learning – CRADLE  
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and Social Sciences**

Helsinki 2013

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ISBN 978-952-10-8214-6 (pbk)

ISBN 978-952-10-8215-3 (pdf)

ISSN-L 1798-3118

ISSN 1798-3118

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**Societal Problem Solving and University Research**

Science-Society Interaction in the Humanities and Social Sciences

**Abstract**

The dissertation studies the relationship between university research and society by focusing on the various forms and means of interaction between university researchers and other societal stakeholders. This is done by scrutinizing the research activities and the organization of scientific work particularly in the humanities and social sciences. The dissertation also looks at the societal impact of university research and describes how societal developments affect the formation of the objects of research, and how these objects change in collaboration with other stakeholders and in relation to societal changes.

The demand for societal impact of research results has been crystallized in the so called third mission activities, which are supposed to create additional benefits or value for society (Zomer & Benneworth 2011, 82). This societal engagement has placed universities as sources of innovation and economic growth. The attempts to develop indicators of societal impact or engagement also affect the distribution of university funding as these indicators become more and more important for the organization of research in universities. The discipline-specific or historical accounts presenting a more complex view on researchers' societal interaction have been few even though disciplinary differences are acknowledged.

The discussions on the third mission have been dominated by the so-called Bayh-Dole framework that focuses on commercialization of university research results. Indicators have been developed mostly to identify commercial activities and numerable outputs (Laredo 2007). However, encouraging universities to profit from publicly funded research and collaborate with industry can be seen to undermine traditional values of research, teaching and service to the community (Atkinson-Grosjean & Douglas 2010). If societal impact is conceptualized only

through the commercial dimension there is a risk that it leads to what Nedeva & Boden (2006) call eroding the capacity of universities to generate “understanding” type of knowledge. Moreover, the focus has been more on natural sciences instead of the humanities and social sciences.

Societal impact and interaction are in this dissertation studied through two cases: research on learning difficulties and multidisciplinary urban studies. Theoretically the dissertation draws from two approaches. First, it is linked to the tradition of science and technology studies (STS), particularly to the constructivist studies of scientific practices (Latour & Woolgar 1979, Fujimura 1987, Knorr-Cetina 1981). Secondly, the dissertation benefits from the cultural-historical activity theory, which sees activity as object-oriented, culturally and socially mediated system, with division of labor and rules that regulate interaction between the participating individuals (Engeström & Miettinen 1999, 9). This approach also stresses the societal aspects of forming research objects, the instruments, and the division of labor of research work.

**Keywords:** science-society relationship, third mission, societal impact, university research

# CONTENTS

1 INTRODUCTION.....	1
2 BACKGROUND AND PURPOSE OF THE STUDY .....	2
2.1 The relationship between science and society.....	2
2.2 Towards bidirectional interaction.....	4
3 RESEARCH QUESTIONS.....	6
4 THEORETICAL FRAMEWORK .....	8
4.1 Scientific practice and objects of research work.....	8
4.2 Mediation and instrumentalities .....	10
5 METHODOLOGY .....	12
5.1 Research sites and cases .....	14
5.2 Data .....	19
6 OUTCOMES (ARTICLES) .....	24
7 TIMETABLE .....	26
REFERENCES.....	27





# 1 INTRODUCTION

This dissertation studies the relationship between university research and society by scrutinizing the various forms and means of interaction between university researchers and other societal stakeholders. This is done by studying the research activities and the organization of scientific work particularly in the humanities and social sciences. The dissertation also focuses on the societal impact of university research and describes how societal developments affect the formation of the objects of research, and how these objects change in collaboration with other stakeholders and in relation to societal changes.

The dissertation is connected to the discussions on societal impact of academic research as well as the relationship between science and society. The demand for societal impact of research results has been crystallized in the so called third mission activities, which are supposed to create additional benefits or value for society (Zomer & Benneworth 2011, 82). This societal engagement has placed universities as sources of innovation and economic growth. The attempts to develop indicators of societal impact or engagement also affect the distribution of university funding as these indicators become more and more important for the organization of research in universities.

The discipline-specific or historical accounts presenting a more complex view on researchers' societal interaction have been few even though disciplinary differences are acknowledged. The discussions on the third mission have been dominated by the so-called Bayh-Dole framework that focuses on commercialization of university research results. Indicators have been developed mostly to identify commercial activities (Laredo 2007). However, encouraging universities to profit from publicly funded research and collaborate with industry can be seen to undermine traditional values of research, teaching and service to the community (Atkinson-Grosjean & Douglas 2010). If societal impact is conceptualized only through the commercial dimension there is a risk that it leads to what Nedeva & Boden (2006) call eroding the capacity of universities to generate "understanding" type of knowledge.

Universities themselves have also been active in adapting to the situation of decreasing budgetary funding and growing expectations for accountability. In addition to the expectations of economic growth research is expected to focus on complex societal problems and create partnerships between researchers, private companies and public service providers. There have been efforts to discuss the definitions of impact in the humanities and social sciences (SA 2006, 15) but more qualitative studies are needed because the main frame for addressing the societal impact of university research is economic. This study addresses this need by providing an alternative outlook on how research contributes to the society.

## **2 BACKGROUND AND PURPOSE OF THE STUDY**

The purpose of the study is to contribute to the discussion on the societal role of university research and its impact. The debates, both at the policy level and in the academic circles, have been dominated by the economic dimension, including the development of indicators that allocate research funding. The approach I assume underlines the historical developments behind the disciplines and societal questions that are taken under scrutiny by researchers. Emphasis is therefore put on how societal questions become “researchable”. Objects of research as well as methodological tools and theoretical resources are considered important in order to understand how research impacts the society. This means scrutinizing how the methods and theoretical understanding of specific disciplines have evolved in connection to societal changes. By analyzing activities in two fields of research my study contributes to a more multiform picture of the ways of impact and interaction between researchers and other societal stakeholders. For instance, science and technology studies (STS) have so far been more interested in natural sciences than in the humanities and social sciences where the impact of research is more difficult to demonstrate even though their contributions to society are significant. In addition, STS has not been interested in how researchers themselves give meaning to their work, and how they see the impact and societal role of their research.

The dissertation studies societal impact and interaction through two cases. The fields of research under study are: research on learning difficulties and multidisciplinary urban studies. The cases are selected because they shed light on the different dimensions of societal impact of university research and provide a more in-depth picture on how researchers interact and learn with other societal actors. The cases selected for this study therefore bring a new angle on the discussions on the societal impact of university research.

### **2.1 The relationship between science and society**

Before turning to the theoretical underpinnings and research objectives I shortly discuss the broader framework for my study and take up some problematic points in contemporary debates on the issue at hand. In particular, the background debates are related to the birth of modern science policy after the Second World War and to the indicators developed to distribute government funding for science. This has left its mark on the way societal impact of universities is understood today and also carried attention away from the practical side of research work and led to the neglect of certain disciplines.

When describing the relationship between science and society the notion of “social contract” has been used to highlight the mutual understanding between these two. This understanding also underlines the autonomy and independence of science. Even though one can find the contractual idea in the philosophical thought of Hobbes, Rousseau, Locke and Rawls (Guston 1992) it is in particular related to the development of modern science policy. In 1945 the Bush Committee published a report “Science: The Endless Frontier” which paved the way for a new understanding of science and its contribution to the society. The report suggested that basic or “pure” research constitutes the foundation for technological and industrial progress (Miettinen & Tuunainen 2010, 8).

The concepts of basic research and applied research became institutionalized and statistics gave them political value (Godin 2003, 80). The viewpoint gained a foothold in many Western countries and it has shaped the understanding of how universities impact the society. In this perspective science’s main contribution is the one it makes on the economy. This viewpoint has, however, given a rather narrow explanation on how university research contributes to big societal questions.

However, scholars (de Solla Price) have pointed out that historical evidence gives a different picture on the mutual interconnection between science and society. Science and technology developed independently from one another, and science did not influence much the industrial revolution. In fact, many technological instruments have made it possible to study new phenomena scientifically. Therefore, experimenting and developing scientific instruments and methods constitutes a bridge between science and technology (Miettinen 2006, 44). The epistemic and societal motives of research are intertwined and alternate depending on the phases of the research. In fact, what is essential is how theoretical work is connected to the development of technology, tools and products (Miettinen & Tuunainen 2010, 11). Different models have been presented to explain changes in the science system: Triple Helix (Etzkowitz 2002); post-normal science (Funtowicz & Ravetz 2003); academic capitalism (Slaughter & Leslie 1997), Mode 2 (Gibbons et al. 1994), and post-academic science (Ziman 1996). However, most of them provide a normative outlook that serves the goals of innovation policy. It is necessary to stress the gradual transformation, contradictions and the differences of knowledge production in different institutions (Tuunainen 2004). Therefore, to provide a more detailed picture I adopt a historical approach that acknowledges the disunity of science, the role of experimentation and tools in science, and the specificity of the science-society interaction in different fields of research (Bernal, ref).

## 2.2 Towards bidirectional interaction

Traditionally the basic missions for a university are research and education. Research results have been communicated through publications, which are reviewed and refereed by the scientific community. Likewise education benefits the society by producing professionals and workforce to the society. Therefore, the societal contribution of universities has been realized through research and education. However, modern universities have encountered significant changes in the wake of globalization and economic constraints. They are considered major players in the liberal economy driven by knowledge and therefore need to demonstrate how they add value to the surrounding society and national economy (Brenzitz & Feldman 2012). The demand for societal impact of research results is related particularly to the concept of a third mission. It is connected to the pressure for change that universities have been experiencing since the 1980s. Especially the OECD promoted the cooperation between universities, industry and the economy. (Venditti et al. 2011, 4; Zomer & Benneworth 2011, 83.) A similar package of policy measures and incentives is being employed to a greater or lesser extent in nearly all EU countries as part of the quest to realize the knowledge economy (Jacob 2003), which implies that knowledge becomes both a means of production and a commodity (Nedeva 2006). However, the idea of universities' societal contribution to the society is not new and it has been argued (Laredo 2007) that it should not be treated as a separate mission. Societal impact has also been connected to terms such as engagement, outreach, relevance, value, benefits and technology transfer (Bornmann 2012, 673).

Roper & Hirth (2005) have described how higher education in the USA has transformed itself from one-directional service to bidirectional engagement. This has happened especially by pronouncing the third mission. Activities at the university level were linked to the Bayh-Dole Act implemented in the United States in 1980. The Act was supposed to boost university-industry cooperation, technology transfer and patenting in universities by means of creating a uniform patent policy in the United States. As a result, universities retained their intellectual property rights to the outcomes of scientific research. New organizations and activities to enhance the commercial utilization of academic research were established, including technology transfer offices, industry-sponsored research projects and spin-off companies. The Third Mission reemerged as pathway to economic renewal and accountability: universities began to change from centers of knowledge to complex businesses with products to market (Roper & Hirth 2005).

The OECD has promoted the Bayh-Dole Act as a model for its member countries as an important landmark in the growth of productivity and innovation (OECD 2000, pp. 75, 77; OECD 2003). The Act has been emulated for example in Denmark, Germany, France and Finland (Mowery & Sampat 2005, 123).

However, there is great variety between different disciplines, since patenting and licensing are important only in some fields of research (Cohen & al. 2003, 133). This approach has strengthened in the 1990s and 2000s when the emergence of innovation policy partly replaced science, technology and industrial policies, and the idea of National Innovation System was introduced. In this framework, at least in the policy rhetoric, universities became actors in an environment that expected them to become more accountable.

As in the case of statistics providing basic research political leverage (Godin 2003), one can see the same kinds of institutionalization efforts concerning the indicators of societal impact. The concept of third mission has been affected by the innovation policy perspective that promotes the utilization of research results, which has mainly meant commercialization of research results, technology transfer and promoting business rhetoric in the universities. In this framework indicators only serve as a means to distribute funding and tell nothing of the long term impacts research has (Esko et al 2012). University research that is carried out in areas where societal impacts take time to realize should not be excluded from the discussions.

Critics (Nedeva & Boden 2006) have argued that third mission activities have narrowly promoted the role of universities only as sources of innovation and economic growth. The debate on societal impact of research has thus evolved around commercialization of research results focusing on countable numbers of patents, licenses, spin-off companies and so on (Laredo 2007). Some critics speak of academic commodification (Radder 2010, Jacob 2009) and others state that the view of research contributing to society in a unidirectional way is maintained artificially by assuming that there is a linear process from university research to society. Furthermore, the definitions of the third mission are evasive and unclear.

In sum, the societal impact of universities and particularly the impact of university research have been considered mostly from the economic perspective that has been backed up by statistics. Therefore, the main concern has been how to measure societal impact of publicly funded research. Furthermore, efforts to measure societal impact have revealed some major obstacles in the operationalization of the indicators. There are differences between disciplines and universities when it comes to how knowledge is produced and can be used, the timing and causality of impact is unclear, and there might be unintended consequences when selecting indicators of impact (Molas-Gallart et al. 2002). Commercial or indicator-based approach leaves behind other forms of social production and grasps the questions of ownership only as market-based solutions, without giving thought to open access and the ways researchers have established their relationships with other societal stakeholders. Bidirectional interaction needs to be studied in order to provide an alternative and more fine-tuned approach for understanding the societal interaction of university research.

### 3 RESEARCH QUESTIONS

The objective of this dissertation is to observe and study the societal impact of university research and the interactions researchers have with other societal stakeholders in the humanities and social sciences. Because the concepts and definitions of societal impact and interactions vary it is necessary to approach these conceptualizations from different perspectives. In the previous sections I have framed my research by connecting it first to the discussion on the relationship between science and society. Second, political changes and economic pressures have emphasized innovation and affected university policy. Third, there have been attempts to establish indicators of impact in order to measure economic benefits from scientific research. I argue that focusing on commercial outcomes has produced a narrow picture of scientific work and the historical connections research and different disciplines have with the rest of the society. Following these premises I argue that the phenomenon of societal impact has been outlined strongly by its economic dimension and the main focus has been on how to measure impact. There has been little room for disciplinary differences and for the self-reflection of researchers' own views on the impact of their work.

Taking the question of societal impact and interaction closer to the actual research practice I wish to provide a more fine-tuned account on how researchers interact with societal stakeholders and how research contributes to societal problem solving. The research problems transform, as do the phenomena subject to research. As knowledge and understanding increase the societal phenomena become understood in a new way.

My research questions are formed along four different topics. The first topic is connected to the relationship between university research and wider society. Changes in university policy and the neo-liberalist marketization of universities (Levidow 2002) are important drivers behind the reforms that have taken place in the universities. In the recent discussions on the societal benefits of research there has been too much emphasis on the commercial or entrepreneurial potential of research leaving out the possible differences between disciplines and their actual historical developments. However, societal developments affect the research in a complex way establishing a variety of means and forms of interaction between university research and society. These historical developments are not only crucial to understand the discipline in question but also to be able to see how societal impact and engagement takes place. This includes issues of how research objects come about. The first question is:

1. How the changing societal developments, problems and contradictions are taken into account in the formation of research objects in the studied research communities?

The second topic goes further with the policy issues of the so-called third mission. The main goal is to find out how the notion of societal engagement or third mission has been conceptualized in the Finnish context and compare it to the international discussions. By focusing on different levels of defining the third mission it is possible to see how different actors define it. The second research question is:

2. How is the third mission defined and operationalized in the Finnish science and technology policy context at the national, university, faculty and research group level?

The third topic takes the concept of societal impact to a more local level compared to second topic. It deals with the impact of research in the humanities and social sciences by scrutinizing what are the researchers own accounts of societal impact. The problem with indicators of impact is that they rely heavily on the economic effects of research and equal societal impact with commercialization of research results (Esko et al. 2012, 40). Therefore, indicators are a justified means of distributing funding to universities but they fail to consider societal and cultural aspects of third mission activities (Laredo 2007, 448). Because of this, I argue, that the discussions on societal impact and engagement of university research need more discipline-specific accounts on – or narratives of – how university research actually interacts with the rest of the society. In this connection, the self-reflection of researchers is of particular interest. Narratives have been used when referring to individual biographies or careers but also to the trajectories of research based innovations and research groups (Miettinen 1998). My aim is to apply the same idea to the research interactions and therefore I use the term narratives of interaction. Narrative research may be able to obtain information that is not usually available by other methods, and it gives in-depth understanding that otherwise would not be noted (Smith 2000, 331). The third question is divided into two questions as follows:

3. a) In which way the researchers describe the contribution of their discipline or research area to the society?
3. b) What kind of trajectories of specific events and interactions the researchers and their partners provide for societal influence?

## 4 THEORETICAL FRAMEWORK

The dissertation draws from two main theoretical approaches. First, it is linked to the tradition of science and technology studies (STS), particularly to the constructivist studies of scientific practices (Latour & Woolgar 1979, Fujimura 1987). Secondly, the dissertation benefits from the cultural-historical activity theory, which sees activity as object-oriented, culturally and socially mediated system, with division of labor and rules that regulate interaction between the participating individuals (Engeström & Miettinen 1999, 9). This way the societal aspects of forming research objects, the instruments and the division of labor of research work are taken into account. In this chapter I establish my theoretical approach by introducing some of the key concepts in studies of scientific practices and cultural-historical activity theory.

### 4.1 Scientific practice and objects of research work

The progress of science can be understood in terms of changing fields of general economic and technical interest (Bernal 1969, 55). Practical experience has often inspired scientific endeavors and science has always been connected to industrial production and technological development. Scientific knowledge is a feature of groups together with their material setups, and mediated by interactions between people and by arrangements in the world (Schatzki 2001, 21). Constructivist studies of science have been interested in how scientific facts are created but they have not addressed the issues of interaction. This dissertation focuses on the interaction between scientists and other societal stakeholders. This means adopting a concept of science, which emphasizes the selectivity of knowledge production and sees products of science as the result of a process of fabrication. Furthermore, it means understanding that instead of the quest for truth scientists are more concerned with making things work (Knorr-Cetina 1981, 118-120). This also means that scientists make problems “doable” through the seemingly mundane processes of organizing and reorganizing their work through articulation that takes place at different levels of work organization (Fujimura 1987, 258) and connect scientific work to larger social worlds of society.

The constructivist turn in the sociology of scientific knowledge refers especially to laboratory studies that analyzed how scientists constructed the facts in their research work. These included several ethnographic studies (Latour & Woolgar 1979, Knorr-Cetina 1981, Lynch 1985 etc.) that provided a new perspective on how scientific work was actually conducted and scientific facts constructed. This approach opposed the “standard view” of scientific facts being reflections of reality that can be “found” by using one scientific method. Instead it argued that



scientific facts are constructed in reflective social processes which, especially in laboratories, include artificially constructed phenomena that can only be controlled in laboratory conditions. This way scientific research objectives become materially constructed, involve active intervention and are a result of constant negotiation (Kiikeri & Ylikoski 2004, 150-153). As Joan Fujimura has stated (1996, 5), scientific practice is diverse and locally contingent.

Karin Knorr-Cetina speaks of objects of knowledge or epistemic objects referring to Rheinberger's idea of epistemic things and considers objects of knowledge to be open, question-generating and complex (Knorr-Cetina 2001, 181). Furthermore, objects of knowledge have the capacity to unfold indefinitely (Knorr-Cetina 1997, 12). Developing Rheinberger's concept of an epistemic thing and experimental system further Tuunainen (2001, 81) argues that in order to offer tools to conceptualize experiments in their larger societal contexts the dual focus of researchers need to be accounted for. In his example of potato-biotechnology research group Tuunainen (*ibid* 82) expands the epistemic thing into a social object incorporating both the epistemic and the applied dimensions of the research results. Drawing from the activity theoretical notion of the object of activity the societal motives built into the object of research work are then displayed.

As stated, in STS object formation in research work has been studied by presenting how a scientific fact is constructed, even though this is only one phase of research activity. Cultural-historical activity theory on the other hand brings into play the historical and material aspects of human interaction, which are mediated by cultural artifacts. Leontev (1978) pointed out that there is no objectless activity. The object of activity is twofold: it exists independently and is selected as the object of transformation, but it is also an image of the object constructed by a subject.

Object formation has been studied in relation to the societal use of research results outside the research community, e.g. in the study on VTT Biotechnical Laboratory specialized in the study of cellulose degrading enzymes (Miettinen 1998, 2005) and in the research on the dynamics of learning in an Aerosol Technology Group (Saari 2003). These studies have shown how the object of activity is complex and contradictory, and how the dual object is important in pushing the research work further. For further discussion I will address this literature more in-depth later on as my research proceeds.

The CHAT approach draws from Marx's ideas of materialism: human beings change their material environments and by so doing produce themselves (Miettinen 1998). Therefore this viewpoint stresses the intentionality of human activity. It resolves the dualism of ideal and material – an attempt made also by the actor-network theory – by introducing the concept of mediation. ANT does not acknowledge this intentionality as the dialectic approach of CHAT does and therefore misses the more dynamic aspect of activity (see Miettinen 1998, 33).

## 4.2 Mediation and instrumentalities

In the laboratory studies the researchers were interested in the social process of constructing scientific facts. The cultural-historical activity theory (CHAT) on the other hand emphasizes the collective nature of activity but includes the idea of mediation and materiality of activity. Like any activity, research work is object-oriented and mediated by artifacts (Miettinen 1998). Furthermore, research work depends on other societal activities that provide it with problems, tools and funds, and utilize its results (Miettinen 1998, 426). Therefore, the CHAT framework connected with ideas coming from constructivist studies of science provides tools for studying the collaboration and interaction between university researchers and other societal activity. It also assumes the active role of those involved and the potential for change.

An important aspect brought about by the CHAT is that activity exists only as mediated, this is its specific characteristic and that communication is foundationally included in the process of activity (Lektorsky 2009, 83–84). Following Lektorsky (*ibid.* 84): “Activity gives meaning to the means of mediation. The same thing that is used as a means of mediation has different meanings and mediates different processes if it is used in different kinds of activity.”

The concept of mediation in activity theory underlines the interactive development of subject, cultural means and an object (Miettinen & Paavola 2012). The concept of object-oriented interagency (Engeström 2005, 27–28) refers to the connecting and reciprocating that is done in fields of multiple and divided activity systems that focus on and circle around a complex object. This concept will be helpful because the cases present how researchers work around such complex objects, i.e. learning difficulties and urban planning.

With reference to the objects of research cultural-historical activity theory brings forth the idea that objects are constructed by means of cultural tools, which operate in constellation that Engeström et al. (2003) call instrumentalities. This is also where Engeström et al. (*ibid.*) come somewhat close to the ideas of Knorr-Cetina even though criticizing her work for lack of historicity. The types of object also matter and new objects generate new instrumentalities. Engeström et al. point out that one has to take into account a specific object as it appears to a particular subject, at a given moment, in a given action. Situationally constructed objects are unstable. Objects do not become constructed without instrumentalities and expansion is qualitative transformation and reorganization of the object. (*ibid.* 181)

The idea of multiple interacting activity systems focuses on a partially shared object (Engeström 2009). Research that is conducted in the humanities and social sciences bears a potential of tackling broad, sometimes obscure, issues that combine the efforts of many researchers and other actors. The shared object of activity is important because the objects of research are not only subjected to the scrutiny

of the researchers but they are perceived as societal problems. They also might have a history on their own. This means that scientific work is in constant dialogue with the rest of the society and at the same time the borders of what is perceived as a problem are under negotiation.

Engeström (2009) speaks of runaway objects when he refers to people constantly creating objects that are non-intentional products that are unintended consequences of multiple activities. In addition, these objects are poorly under control and can potentially expand to global scale of influence. In this category one could place “natural forces” such as diseases and environmental threats (ibid, 3). The cases presented in this study can be considered to have certain “runaway” traits even though they would not qualify as runaway objects as such. An example of these kinds of runaway traits was presented by one of the interviewees in the case of learning difficulties. He pointed out how the development of more specific diagnostic tools of learning difficulties might actually produce unintended consequences such as labeling a child “deviant” and medicalization of the difficulties even in a case where the problem would be more related to the school environment. This makes learning difficulties an issue that becomes “larger than life” and changes the way other people in school treat the child. Also using difficult and complex terms in relation to learning difficulties might reduce the teacher’s ability to deal with these issues.

## 5 METHODOLOGY

In this dissertation a combination of data and methods are used. At first the focus will be on historical developments (both at a general and more specific level) and accounts produced by the researchers. These developments are complimented with other documentary material in order to provide a timeline of events. Activity theory provides a methodological approach that uses periodization and takes into account the processes of evolving contradictions in those periods. Therefore key contradictions in a period and explanatory hypothesis bring more depth into the analysis. As Engeström (2005, 315) points out: “History needs to be studied as local history of the activity and its objects, and as history of the theoretical ideas and tools that have shaped the activity.” As many of these histories are local and case-specific, one methodological approach is to examine them with the help of narratives. Narrative interviews are conducted with researchers and their collaboration partners in order to provide accounts on how research objects are formed, and how the interviewees see the contribution of research in the field in question. So far, I have produced a timeline draft of general histories of the cases, which will be complimented by more specific “biographies” of single artifacts.

In STS constructing scientific facts and the processes of technological innovations have been followed and reported by researchers. Hughes (1986, 282) has stated that histories of science and technology have been non-contextual, and that invention of artifacts and discovery of facts have been presented in a chronological narrative. In these narratives technology and science have been treated separately. Scientific heroic achievement (such as fighting a disease) is also a known form of narrative, particularly present in newspapers and other media (Bazerman 1999). Ludwig Fleck’s *Genesis and Development of a Scientific Fact* is one of the most known contributions to present the production of experimental facts. For Fleck a fact is not objectively given but a social event (Trenn 1981). Fleck has also inspired laboratory studies that showed how facts first appeared as “local knowledge” in a specific (laboratory) setting (Golinski 1990, 495). Latour & Woolgar portrayed science as a “rhetorical enterprise”, and as a form of persuasion for legitimizing science’s authority (Golinski 1990, 497–499). Latour’s (1983) famous example of Pasteur’s work emphasizes the inscription devices: “the only way they (people) can talk and not be undermined by counter-arguments as plausible as their own statements is if, and only if, they can make the things they say they are talking about easily readable.” (Latour 1983, 161). In research on innovation detailed qualitative case analyses have replaced myths about innovation as linear and goal-rational process (Hyysalo 2004, 23). The Minnesota Innovation Research Program (Van de Veen et al. 1986) for example

examined how innovations emerged, developed and terminated over time providing a detailed analysis on 14 longitudinal cases.

Taking up the notion of narrative my aim is to track down accounts as they are produced by researchers. In this context it is important to consider to whom and for what purpose the narratives have been made. Two cases have been selected for this study and they will be presented in the following section. Interviews gathered so far have included information on the development of the research areas in question as well as provided insight to the connections between researchers and other actors in the field. Related to this development is the history of tools and instruments. Together with theoretical understanding, methods, tools and instruments have been essential in understanding the object of activity. This is why the dissertation tracks down the histories and development of tools, such as Grapho-game (see case presentations). These histories are also related to narratives that are produced. In the histories and accounts provided by the researchers, conflicts and controversies are important. I will start by constructing a timeline based on the interviews and other material. Additional and complimentary interviews will be conducted to sharpen the picture.

Kajamaa (2010, 81) has combined narrative accounts with activity theoretical view on remembering as mediated by socially–historically evolved artifacts such as tools or instruments. She uses emplotment (a term used e.g. by Ricoeur) and categories to identify narratives and analyze the data. Kajamaa's example demonstrates how narrating is active, interpretative and interactive effort to understand single events, circumstances and unexpected results. The narrative approach can be extended to include other accounts than just those of individual researchers. In narrations about science and technology policy science was portrayed as autonomous and scientists as beholden only to truth (Slaughter & Rhoades 1996). In the late 1970s and early 1980s, this began to change. Although the old heroic narratives continued to be invoked, the new narratives about science and technology focused more on economic competitiveness. (Slaughter & Rhoades 1996).

Also indicators that serve to provide a picture on how the society and the economy benefit from university research are based on administrative discourses that are related to the production of certain kinds of knowledge about society (see Kalpagam 2000). As Kalpagam (2000, 43) states statistical representations are a form of enabling interventions in social, physical and natural processes: at the same time classificatory frames and objectification as an aspect of normalizing power is unique to the modern state and Western science. Statistical facts are easily considered objective and assume a universal character (ibid 44, Asad 1994).

The concept of narrative has been used by Garnåsjordet et al. (2012, 323) when taking a critical look at the sustainability indicators. They state that indicators are a result of societal and political interaction between institutions and the rest of the society (ibid 326). Societal interests and normative values are embedded in the choices that affect the data-generating process. The indicators developed for example by the national agencies and by the universities themselves reflect one side of the narrative – in a sense, the normative and official one. Therefore, alternative narratives reflect conflicting societal interests and ground the data in a context where these interests are expressed (see Garnåsjordet et al. 2012, 327). As a narrative, indicators rely on a progressive idea of development, where the “raw material” within universities’ is turned into a “product”.

## **5.1 Research sites and cases**

The dissertation focuses on a particular phenomenon – the societal impact of university research. Therefore, the cases chosen here demonstrate this phenomenon. The emphasis is on the humanities and social sciences, which have had a minor part in debates concerning the societal impact and engagement of universities. Two fields of research are scrutinized: research on learning difficulties and multidisciplinary urban studies. The cases present how complex societal problems have become objects of research through historical developments in society and how they have changed as knowledge has been generated in relation to material tools developed. Different disciplines have evolved in connection with societal developments and these developments have affected research topics relevant to that particular discipline and shaped the forms of interaction that researchers have with other societal stakeholders (Esko et al. 2012). Therefore the definitions of what constitutes the societal problem are connected to the formation of research questions but not necessarily in a causal way. In addition, the aim is to find out how other societal actors are involved in constructing the object of collaboration of research. The cases are selected to represent research areas that have traditionally had strong national relevance. Both cases have a variety of collaboration partners and means of interaction with the societal stakeholders. Furthermore, the research groups have been societally active. Below are the descriptions of the cases including a short introduction to the history and development of the research area in Finland. I have also included two examples on the formation of research objects and the way societal impact is realized. These two examples are also the ones that can be constructed as narratives from the interviews already made.

## Case 1. Research on Learning Difficulties

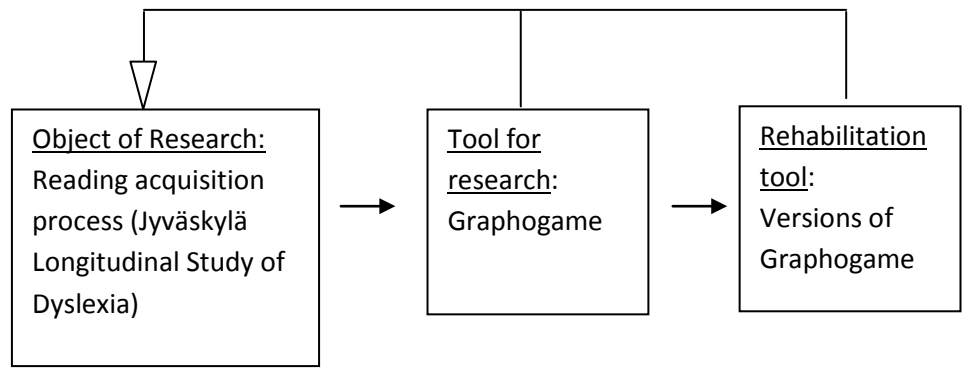
Conceptualizations of learning difficulties in Finland have changed over time (Graham and Jahnukainen 2011, p. 276): From the early twentieth century until the 1960s learning difficulties were defined in psycho-medical terms and analyzed as abnormalities or handicaps within the context of rehabilitation. This view changed as the establishment of the universal comprehensive school system took place in the 1970s. All the children of an age cohort were to achieve the goals of the curriculum independently of their social background and their natural talents. The “principle of overcoming the learning difficulties” as a pedagogical ideology and organizing principle of the comprehensive school was inspired by educational equality. More recently learning capabilities and skills, and the issue of overcoming learning difficulties have become a focal point for social, labor and even innovation policies.

Several organizations contribute to the solving of learning difficulties in Finland, including civic and vocational associations. Two university research units are instrumental in proving new knowledge, diagnostic and screening tools as well as learning materials for the special education system: Niilo Mäki Institute (NMI) and the Centre for Learning Research of the University of Turku. The focus of the dissertation is on the former unit. The Niilo Mäki Institute was established in 1990 to recognize and understand neurocognitive dysfunctions and learning difficulties, and to find means of rehabilitation. The research in NMI has followed the tradition of natural sciences and experimental research but combined it with research on education. NMI has developed a variety of mechanisms through which it interacts with society and contributes to the solving of learning problems in Finland and abroad. For instance, it maintains the Child Research Clinic together with the Child and Family Counseling unit of the City of Jyväskylä. As for the methods and practices of research there has been a shift from collecting massive test patterns to more individual interventions and group rehabilitation. The clinic works as a prototype system and it has moved away from neuropsychology towards pedagogical questions. Much of the work is evidence-based guided by theoretical models of well-defined hypotheses.

Problems related to learning are a combination of perceived difficulties that can manifest themselves in reading, mathematics, motor skills, language and attention. Research on learning difficulties therefore combines a range of theoretical and disciplinary approaches. Learning difficulties as an object of activity are multifaceted; the researchers have different theoretical explanations considering the origins of e.g. dyslexia and they work on slightly different areas around the object. At the same time there are other stakeholders (civic associations, teachers, governments) who tackle the same problems but with differing goals in mind. All these actors collaborate in order to better understand and tackle the problem of

learning difficulties. Researchers are usually interested to share their results with the academic community and they rely on the rules of good academic conduct. Their tools (methods, brain scanning instruments etc.) differ from those of other involved in overcoming learning difficulties (teachers, politicians). Even with their primary focus being on the academic knowledge production the researchers are dealing more and more with other stakeholders and stating the societal relevance of their research. Therefore, they have made new openings in explaining the societal significance and impact of their work (Lyytinen & Lampola 2012).

Concerning the formation of research objects this case shows how the motives of research intertwine and how tools transform and shape the new emerging objects of activity. The object of activity is the problem of learning difficulties in a country based on universal educational system and increased educational requirements. Social production and open access are connected to the development of research objects and the use of tools in research. This is demonstrated by the development of a remedial tool (Graphogame), originally created for research purposes. Graphogame also serves as an example of a research-based tool for societal use. Here I will present a short account on the development of the game as it has come up in the interviews and other documents. The background of the game was in a longitudinal study on dyslexia, in which one of the aims was to see how the process of reading acquisition took place. The researchers developed a computer game that was supposed to work as an analytical research tool by providing information on the reading acquisition process and the possible “bottlenecks” in that process. The game was available on the internet where children could play it for free. After a while the researchers realized that the game actually helped children to learn how to read. Therefore they developed the game further and now the game has different versions for different languages and it is distributed worldwide. It holds a particularly strong promise for children in under developed countries. What is interesting is that Graphogame also contributed to the outlook on differences between languages and reading acquisition process, thus changing the research object. This shows how tools change the objects of research:





Interwoven with Graphogame is the development of a web-based information platform (LukiMat) that is used by professionals, teachers and parents of dyslexic children. These two examples demonstrate how intellectual property rights can become a complicating element for the actual work of researchers. There seems to be a tension between private and public good and the motives of research. Learning difficulties are connected to the Finnish school system, where education is seen as a universal service. Therefore, the researchers have resisted attempts to profit from it (Lyytinen & Lampola 2012) and tried to introduce different ways of distributing the game worldwide. The example of Graphogame shows how the forms of social production are characteristic of scientific work (Benkler 2006, 43). It is also an example of how the research work contradicts with the official outlook on profitable goods.

## **Case 2. Multidisciplinary Urban Studies and problems of urban planning**

Urban studies have a close relationship to industrialization and the urbanization of European and North American societies from the late nineteenth century onwards. The new social environment that was developing throughout the Western world also aroused interest in academic research, which began to pay attention to the particularities of city life and its segregation into specific urban areas. In Finland, the large-scale industrialization and urbanization process took place later than in most European countries, that is, only after the Second World War. The research on urbanization was started, however, during the early 1930s by sociologist Heikki Waris (1973) who studied the characteristics of the workers' district in Helsinki. The major wave of urbanization took place, however, as late as in the 1960s, with corresponding attention to the altering ways of life of those who had moved from the countryside to Helsinki Metropolitan Area (Kortteinen 1982).

Urban studies institutionalized relatively late into the Finnish university system, and gained prominence during the 1990s (Jauhiainen and Harvio 2008). A major event in this respect was the establishment of nine professorships in urban studies in two major universities of the country, the University of Helsinki and the Helsinki University of Technology. These professorships represented a whole variety of specialties, including sociology, geography, history, ecology as well as others. The establishment of these posts was a result of a distinctive form of collaboration between the two universities, cities in the Helsinki metropolitan region as well as the Ministry of Education. In this case the focus is on the research group of multidisciplinary urban studies in the University of Helsinki lead by Professor Mari Vaattovaara.

In urban studies the researchers use both quantitative and qualitative methods in their work. They also produce models that predict possible changes in the

future and include historical analysis in their work. The researchers in this case are active in debates concerning societal questions and especially urban planning. In the field there are many links between research and urban planning: universities and universities of applied sciences are linked in a network with other regional actors, such as the cities, provincial associations as well as businesses and civic organizations to plan and implement projects promoting the vision and policy development for the greater Helsinki area (Kosonen 2008). Therefore the case provides rich material for understanding the way researchers reflect the impact of their work but also how they engage in negotiation with other societal stakeholders in order to alter the outlook on societal questions.

Researchers in this case are often involved with politically controversial issues such as urban planning, housing questions and social problems. The object of activity in this case is urbanization, the development of cities combined with their social dimensions. Researchers have tackled these questions by studying possible increase in social exclusion, marginalization and deprivation. Theoretically they have contributed to the socio-economic polarization thesis. Their tools and methods have included factor analysis and the new geographic information systems (GIS) approach. The results have been interesting both in the viewpoint of urban planning and administration, sometimes questioning the choices suggested by policy-makers. An example of how researchers have engaged in urban planning and produced policy relevant research is the development of a research course including field work and collaboration with city officials. In 2004 two professors started to develop the idea and practices of a research course that would combine theory and practice. They got involved in a joint project to improve the suburb of Peltosaari in the city of Riihimäki. The problems in the suburb had started after the oil crisis and economic recession in the 1970s. As a result, the focus of house production in the area moved to rental apartments and the suburb suffered from high unemployment rate and massive social problems. The so-called Peltosaari project was a forceful effort to improve the area through a joint effort by VTT Technical Research Centre of Finland, city of Riihimäki, the Housing Finance and Development Centre of Finland (ARA) and the University of Helsinki.

The characteristic feature of the interaction between academics and the city of Riihimäki's officials was the strong involvement of undergraduate students in the process. The specific contribution by students and professors in this context was to offer a wider social scientific perspective to complement the technical and economic point of view emphasized by the other actors involved. The professors and students produced a report building of a comprehensive, socio-structural perspective where renovation of buildings was integrated with social issues and the operation of housing markets. The report substantiated the urgent need for a wider societal perspective in the planning and renewal of urban suburbs. As the Chief of Town Planning in Riihimäki, said:

*“The socio-economic indicators published in that [report] got the decision-makers back up. The fact that we are at the worse end of the range in the [Helsinki] metropolitan area on many indicators – we wouldn’t have guessed that, and wouldn’t have dared to judge so, and nobody wouldn’t have dared to pluck that out of the air that, really, this is the worst [suburb]. [If someone had done so] he or she would have been condemned. But having been supported by real knowledge [...] people listened to it [i.e., the presentation describing the findings published in the report] after all [and concluded] yes, it must be true. Something must be done. It created a feeling that something has to be done.”*

The second outcome from the research course was the development of students’ understanding of urban problems and ways of solving them as well as their increased skills of conducting research. Concerning scientific contribution, the course offered a concrete setting for the incorporation of the newly developed international perspective into the Finnish urban studies literature.

## 5.2 Data

Data has been collected thus far from the fields in question<sup>1</sup>. This material consists of 18 interviews with key researchers in the studied research communities, their partners of collaboration as well as users of knowledge and expertise. As these interviews were of preliminary nature they focused on the means and forms of interaction that the researchers have with other societal stakeholders. As such they provided a starting point for data collection and helped to direct the research. In addition, documentary material has been collected including different kinds of publications, such as research plans, peer-reviewed scientific papers and articles, books and reports written for larger community, practitioners, politicians and the general public.

Different types of data will be collected according to the research questions and depending on the case in question:

Question 1. How the changing societal developments, problems and contradictions are taken into account in the formation of research objects in the studied research communities?

- a) Interviews with researchers and possibly additional interviews with the most important collaboration partners of the researchers.

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<sup>1</sup> The data have been collected in the project “Varieties of the Third Mission: University-Society Interaction in Different Disciplines”.

- b) Different kinds of reports, referred to as “gray literature” (Miettinen 1993, 37) that consist of working paper series by universities and research institutions. Because they are not meant for scientific purposes they may provide more background information on the researchers’ intentions, and present their perspective more broadly and in a less formal way. This type of literature may also provide more arguments for other stakeholders than the scientific community. An example of this kind of data is the free learning material and descriptions of certain phenomena under study.
- c) Articles in professional and scientific journals that are directed at researchers, professionals working in the field and other broader public. The scientific publications are obviously important because of their scientific contribution. The idea is not to read everything but to focus on a few important publications. Professional journals on the other hand provide a specific perspective on what is considered to be of importance in the field. For example in the case of learning difficulties NMI Bulletin published by Niilo Mäki Institute combines reviewed research articles and reports presenting practical activities such as new experiments, practices and methods in the field.
- d) Newspaper and journal articles provide information such as expert interviews and statements that give also a perspective on how a particular societal problem is perceived in public.
- e) Project plans and reports provide important accounts on the significance of the research, and how the results will contribute to the society and scientific debate. Project plans show how researchers justify their research proposals and how next steps of actual work are supposed to be taken. These plans and reports provide the perceived importance of the project and its expected results in a nutshell.

Question 2. How is the third mission defined and operationalized in the Finnish science and technology policy context at the national, university, faculty and research group level?

- f) Documents and legislation at the national level will focus on the justifications of the third mission on the higher policy level. The University Act states that societal interaction is one of universities missions but the definitions leave room for universities themselves to define and carry out that mission. Therefore, the documents chosen as data are selected in order to provide a broader picture at the national level and to include documents that actually make a reference to the third mission. There are three types of documentation:

- g) The memorandum of the Committee of the regional development of higher education 4.12.2001 concerning the third mission; reports and proposals on universities' societal impact published by the Ministry of Education or its committees (OPM 2002, OPM 2007, OPM 2007b) and the Ministry of Industry and Finance (KTM 2002);
- h) Legislation and the government proposals concerning the change of the University Act, and a recording on the press conference by the minister of Education on the renewal of the University Act to the extent they provide information on the issue;
- i) Reports by the two funders of public research: The Academy of Finland, and Tekes, who have been in charge of the development of third mission indicators and framework on the national level
- j) Documents at the university level: This set of data goes into the institution level by taking under scrutiny the actual proceedings and operationalization of the third mission in Finnish universities. This means their university strategies, handbooks drafted to guide administrative activities and memoranda of committees established to tackle the issue. An overall picture of the definitions of the third mission will be presented but only one or two universities are addressed in detail.
- k) Documents at the faculty and department level: strategy documents and material from strategy seminars and discussions (some can be found on the internet).
- l) Interviews will be conducted with the representatives of university central administration, faculty administration and department administration. The interviews will supplement the documents.

Question 3. A) In which way the researchers and other stakeholders discuss the contribution of their discipline or research area to the society?

- m) Interviews are the most important data when finding out how researchers and other stakeholders understand the societal impact of the research work and how it has possibly changed or transformed.
- n) Documentation on the development of the research field, historical accounts etc.
- o) Public presentations and discussions: videos where researchers present their research; possibly observation of public presentations and discussions.

Question 3. B) What kind of trajectories of specific events and interactions the researchers and their partners provide for societal influence?

Differing from the question 3 A) this question presents more case-specific trajectories that are constructed either by the researchers themselves (i.e. by writing a description) or in collaboration (during interviews, engaging in dialogue about my interpretations). The plan is to take a closer look at certain outcomes of research such as Graphogame, LukiMat in learning difficulties, and research course in urban studies, and ask for the interviewees to tell about them. Therefore, narrative or active interviews (Riessman 2006, Gubrium & Holstein 2004) may prove to be helpful.

- p) Narrative interviews, recall or written accounts by researchers and other stakeholders.

**Table 1.** Research questions and data collection

Question	Existing data	Data to be collected
<b>How the changing societal developments, problems and contradictions are taken into account in the formation of research objects in the studied research communities?</b>	Case 1: 3 Interviews with researchers 12 articles in Psykologia Journal Special Issue on learning difficulties 2011, 11 scientific articles on dyslexia, 4 other articles/reports on subject Case 2: 2 interviews with students and researchers 2 interviews with researchers	Interviews with researchers gray literature  Articles in newspapers, professional and scientific journals Project plans and reports
<b>How is the third mission defined and operationalized in the Finnish science and technology policy context at the national, university, faculty and research group level?</b>	The memorandum of the Committee of the regional development of higher education 4.12.2001 Proposal for new University Act and the new University Act 4 Reports and proposals on universities' societal impact published by the Ministry of Education and its committees, and the Ministry of Industry and Finance 6 documents from Academy of Finland, and 1 from Tekes concerning the societal impact of research, and 2 documents from Research and Innovation Council (TIN) Memorandums of the Council for Societal Interaction and the "Quality Manual" of Faculty of Social Sciences (Jyväskylä), Programme for Societal Interaction (Helsinki), and 12 general descriptions (strategies etc.) of societal interaction/impact of 12 universities	Interviews with the members of Councils for Societal Interaction (HKI and JKL)  Interviews and documents at the department level
<b>A) In which way the researchers discuss the contribution of their discipline or research area to the society? B) What kind of trajectories of specific events and interactions the researchers and their partners provide for societal influence?</b>	Case 1: 4 Interviews with researchers including narrative elements, 1 personal written account Case 2: 3 interviews with researchers' partners (e.g. city administration), 2 interviews with researchers 2 videos of researcher's presentations on their research and ideas on impact.	Interviews with researchers and their partners; disciplinary-specific documentation on the development of the field, different accounts (written, oral) by the researchers, documented material from research groups

## 6 OUTCOMES (ARTICLES)

The outcome of this study is an article-based dissertation following the preliminary list of articles. At this point I follow the structure of my research questions so that the idea is to write one article per one research question.

### **Article I: Formation of research objects**

This article (Esko, Tuunainen & Miettinen 2012: Social Impact and Forms of Interaction between University Research and Society in Different Disciplines. *International Journal of Contemporary Sociology*) answers the question “How the changing societal developments, problems and contradictions are taken into account in the formation of research objects in the studied research communities?” The article discusses the interaction between university research and society and examines various forms and means of that interaction. In addition, it considers the impact of university research in the humanities and social sciences concluding that there has been too much emphasis on the commercialization of research results, and that quantitative indicators are not able to capture the whole array of social and cultural impacts of research. Therefore, more qualitative research on the impact of university research should be conducted to provide historical and discipline-specific accounts that acknowledge the long time span behind important societal developments that intermingle with academic research.

### **Article II: Beyond the third mission: understanding the third mission in Finnish context**

This article addresses the question “How is the third mission defined and operationalized in the Finnish science and technology policy context at the national, university, faculty and research group level?” This article assumes a critical stance to the indicator-based perspective of conceiving and conceptualizing societal impact. It presents an analysis on the Finnish developments in connection to the international policy context and seeks to present and compare the conceptualizations on different levels. It also considers the ways the third mission is operationalized in the higher policy level, administrative level and faculty level in order to describe the phenomena it entails. In this article the ideas of commodification might prove useful. The article also addresses questions of knowledge production and universities role in the economy by asking who should define the relevance of usefulness university research. The analysis is based on qualitative content analysis and narratives inherent in the large documentary material.



## **Articles III and IV: Trails of impact**

### **Article III: Urban Studies**

This article goes further to present the viewpoints of researchers and their own understanding on the societal contribution of their research area. It presents the cumulative aspects of research results in urban studies. The article addresses the issues of impact in three levels: how researchers and research results affect the policy decision-making; how urban studies research is framed in the media, and how it is integrated in the civic discussions and public debates. Data and methodology include: interviews with policy-makers and researchers, especially when addressing the research results contribution to public policy and decision-making. Newspaper articles collected from main newspapers and periodicals to see how media frames the questions related to urban studies. To get a picture of the civic and public debate a (political) weblog and internet discussions will be followed at least in two different forums. In addition, there is video material of the researchers explaining the results of their research and commenting their work and policy making.

### **Article IV: Learning Difficulties**

The aim of this article is to present in-detail accounts and narratives of specific outcomes in the case of learning difficulties. This includes the development of a remedial tool Graphogame that was originally designed for research purposes as well as LukiMat, a platform for distributing research-based and practical knowledge. Also connected to these computer and internet-based tools there are efforts to disseminate the results worldwide, for example through developmental co-operation in Africa. The development and societal interaction in this case, in contrast to the other case, seems to be more evolutionary and expansive.

## **7 TIMETABLE**

### **2013**

I focus on the data collection and analysis of the empirical data in spring 2013. I will start writing an article on one of the cases (learning difficulties) after having done additional data collection in May-June. Finishing and submitting this article is my priority in 2013 but I plan to start orienting towards the next article already at the end of 2013 by collecting data and reading theoretical and other literature.

Participating seminars organized by DWRAE and the doctoral school (FiDPEL) is an important part of my studies. I am also attending a seminar for the postgraduate students organized by the Faculty of Social Sciences as well as two international conferences: Nordic ISCAR (Kristianstad, Sweden) and Annual meeting of 4 S (San Diego, USA).

### **2014**

This year I focus on data analysis and writing an article on the second case (urban studies). I will start the data collection for the remaining article (policy-oriented article) during 2014.

I will continue by collecting data and establishing a theoretical and methodological base for the upcoming policy related article. After writing that article I will focus on the summary part of my dissertation.

### **2015**

Depending on the publication schedule I hope to start writing the summary part of my dissertation. Leaving the dissertation for pre-examination, and defending my dissertation is supposed to take place by the end of the year.

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